NOAA Program Overview

Briefing to SC2002

Bill Turnbull

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Outline

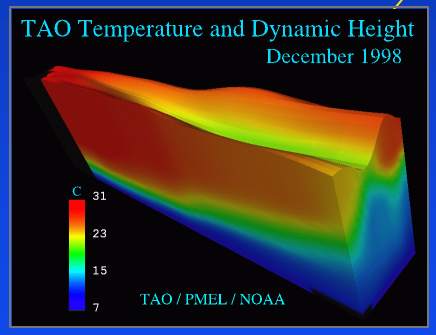
- NOAA Role in IT R&D
- NOAA Program Overview
- HPC R&D

Advanced Information Technology
NOAA's Relationships with Other Agencies

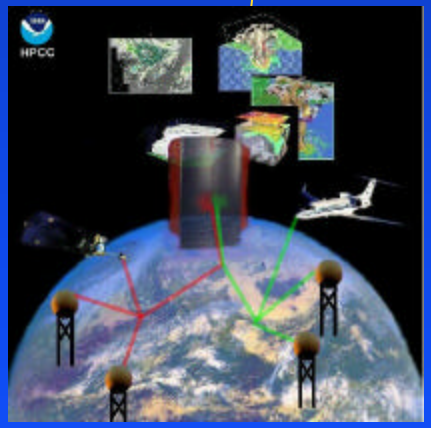
IT Research for NOAA Missions

Real-time Collaboration: Internet-@ Sea, OceanShare

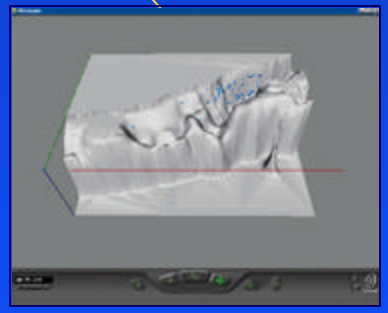
Accelerate information technology development to revolutionize NOAA missions today.



Seasonal-Interannual Climate: Distributed Collaboration Visualizing the environment



Computation and Access to Data: Satellites, Radar, Aircraft, In situ, Models



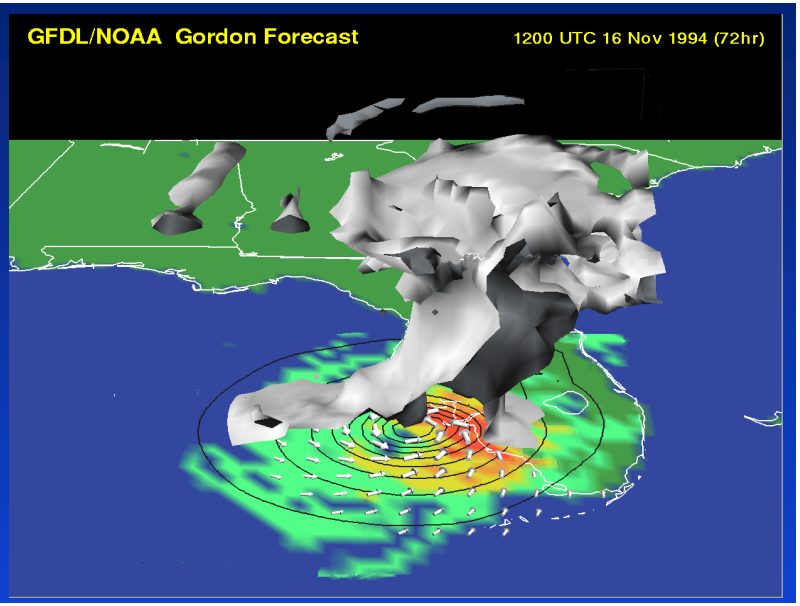
Fisheries Model Analysis: FOCI models of Pollack larvae in Shelikof Strait, Alaska

Hazardous Spill Response: Anywhere, anytime connectivity

Program Strategy - High-end Computing

- High End Computing and Communication
  - Develop skills, algorithms, and techniques to fully utilize advanced computing for improved environmental understanding and prediction
    - Partnerships
    - Seed knowledge
  - Support acquisition and use of High Performance Scalable Systems for research

High End Computing



Goal

Expedite improved weather and climate models.

Technical Approach

- Support advanced computing at the NOAA research laboratories
- Develop software tools to optimize the use of modern scalable computing for NOAA problems
- Infuse new knowledge through new talent (post-docs and contracts)

Customers

- NCEP
- GFDL
- FSL

Collaborators

- NASA
- NCAR
- NRL
- NERSC, Sandia
- IBM, HPTi, Raytheon, SGI

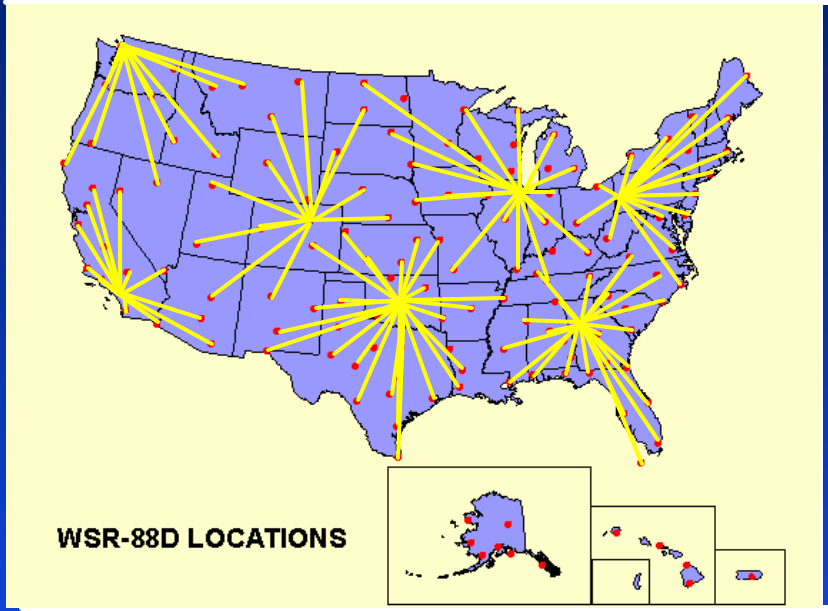
Recent Results

- NCEP high resolution global model operational on SP2
- FSL acquired advanced HPTi - Intel Linux system **(#8 on Top 500)**

What's Next?

- Acquire follow-on to 2-year old GFDL Raytheon/SGI (FY03)
- Enhance models to take advantage of next gen SP2 (FY03)
- Begin testing 13 km Conus-RUC (FY03)
- Collaborating on next gen Weather Research and Forecast model (WRF) (FY03)

Networking - NGI



Goal

Use advanced networking technologies to enhance NOAA data collection and dissemination.

Technical Approach

- Connect NOAA research sites to the Next Generation Internet
- Explore native multicast to disseminate high volume data to universities, DoD and NASA

Customers

- NWS/OSO, NCEP
- Atmospheric Science Departments at Universities throughout the US

Collaborators

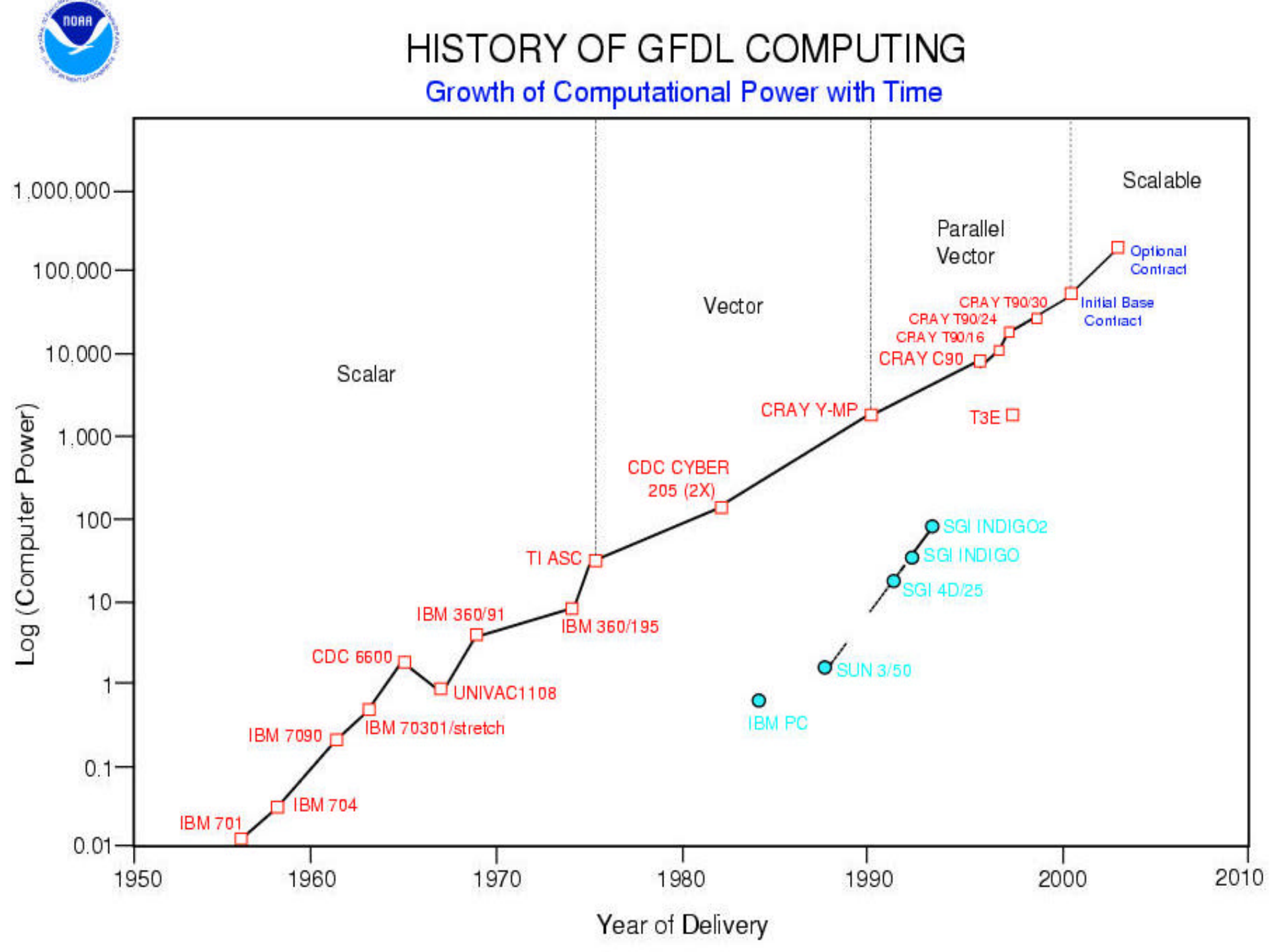
- NSF, NASA, DARPA
- University of Oklahoma
- Internet2, Abilene
- University of Maryland

Recent Results

- Four NOAA sites connected

What's Next?

- Upgrade Miami connections (FY03)
- Collect NEXRAD data in near-real time (FY03 fwd)
- Evaluating National Light Rail


HISTORY OF GFDL COMPUTING
Growth of Computational Power with Time
Scalar
Vector
Parallel Vector
Scalable
IBM 701
IBM 704
IBM 7090
IBM 70301/stretch
CDC 6600
UNIVAC1108
IBM 360/91
IBM 360/195
TI ASC
CDC CYBER 205 (2X)
CRAY Y-MP
CRAY C90
CRAY T90/16
CRAY T90/24
CRAY T90/30
Optional Contract
Initial Base Contract
T3E
SGI INDIGO2
SGI INDIGO
SGI 4D/25
SUN 3/50
IBM PC
Log (Computer Power)
0.01
0.1
1
10
100
1,000
10,000
100,000
1,000,000
1950
1960
1970
1980
1990
2000
2010
Year of Delivery

Key Facilities

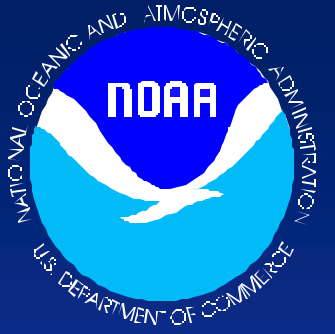
- NCEP (#35 & 36)
- GFDL (#265, 266, 267, 268 & 269)
- FSL (#8)

Software Research and Development

Key Design Factors

- Management of Complexity
- Collaborative Development
- Usability
- Performance
- Portability

Software Research and Development



Climate Model Infrastructure

- Develops Coding Standards for U.S. Climate Modeling Community

Participants:

- NOAA: GFDL, NCEP
- NASA: GSFC
- NSF: NCAR
- Universities: MIT, FSU, UCLA
- DOE: LANL, LLNL
- Navy: Fleet Numerical

Software Research and Development

Weather Research and Forecasting Model

- Develop Coding Standards for U.S. Weather Research and Forecasting Modeling Community

Participants:

- NOAA: FSL, NCEP
- NSF: NCAR
- Universities: OU, U WI, …
- Navy: Fleet Numerical
- Air Force: Offut

Software Research and Development

Benefits

- Manage increased model complexity
- Improve scientific productivity
- Promote sharing of software (and data)
- Reduce redundant development effort

Challenges

- Getting people/organizations to work together
- Substantial development effort
- Transition Research Codes to Operations